RAPID

CONCRETE MOULDING MACHINES

General information for the Production and Application of "Rapid" Concrete Masonry Units.

With the Compliments of

HALL & PYNE PTY. LTD.

Manufacturers of Concrete Machinery

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METHOD OF OPERATION

1. Plain Rectangular Blocks. The machine is prepared for filling, i.e., the lid is opened, the compressing handle raised to a vertical position, and plunger (or moveable mould base) rests on the filler adjustment screws with the lifting lever pulled to the right, clear of the cable. First a pallet is dropped in the mould, followed by the material, which is given a quick spread with a screed cut from a piece of strong tin. The lid is closed and the material compressed by forcing the compressing lever through to a horizontal position. This movement is commenced by hand and, when the lever is at a suitable angle, the operator completes the movement with the foot, using his **full weight**, to force the lever through. No excesssive ramming is necessary, but there should be enough material in the moulds so that the full weight of the operator is necessary for compression. Blocks made under these conditions with normal mixes give first-class tests as per standard specifications. At the same time as the compressing action, the lifting lever is automatically thrown round to make contact with the cable so that the cable clips will engage it when the lid is raised. The block is ejected by raising the lid with a steady **pull**, and is then carried away on the pallet.

The machine is prepared again for filling by raising the compressing lever and releasing the lifting lever from the cable clip by a smart pull to the right with the left hand so that the plunger can be lowered to the filler adjustment screws. It is not advisable to let the plunger drop as soon as the lever is released, as this could cause unnecessary damage. It is a simple matter to take the weight with the hand and lower smartly to the filling position. Another pallet is then dropped in and the procedure repeated.

2. Hollow Blocks. The procedure is the same as for plain blocks.

3. Curved Blocks. The procedure is the same as for plain blocks. However, for tank or silo work the blockmaker will want to make use of the recessing rod to form the recess for steel reinforcing rings. After the material has been placed in the mould and spread evenly, this rod is placed in the slots provided before the lid is closed. When ejection takes place, the rod is carried clear of the machine on top of the newly-formed block and is lifted off smartly before transfer of the latter to the stacking benches.

4. Bricks of Standard Size. The procedure is the same as for plain blocks, except that no pallets are dropped into the mould, the bricks being made directly on steel pallets, which are hinged to allow their turning on to drying pallets after ejection. The method of turning is as follows: The drying pallet is held in the palm of the left hand against the side of the brick, i.e., at right angles to the steel pallet. Using the finger grip provided, the operator then turns the brick on to the drying pallet. This action should be smooth and without hesitation, keeping the drying pallet always at right angles to the steel until the weight of the brick is felt in the left hand, when it is drawn away and carried to the stacking benches.

As it is extremely difficult at the present time to secure timber in the large quantities that would be necessary to have these available to purchasers, the makers do not contract for the supply of pallets. The onus is on the purchaser to provide himself with them from his local sources of supply (timber yards, etc.). At the same time this will be found to be more economical, as freight charges are eliminated.

PALLETS

1. Blocks. Each block of a day's output requires a pallet which can be cut from any suitable scrap timber or obtained from the nearest mill. Probably the best timber for this purpose is 6 in. x 1 in. hardwood. A little clearance is necessary for free movement, but too much should be avoided, as fine aggregates could be forced between the pallet and the sides of the moulds during compression and cause jamming or chattering when the block is being ejected. It should be noted that, if the wood is not thoroughly seasoned, some shrinkage will take place and any reduction necessary to the width of the pallet should not be undertaken until the timber is thoroughly dried out.

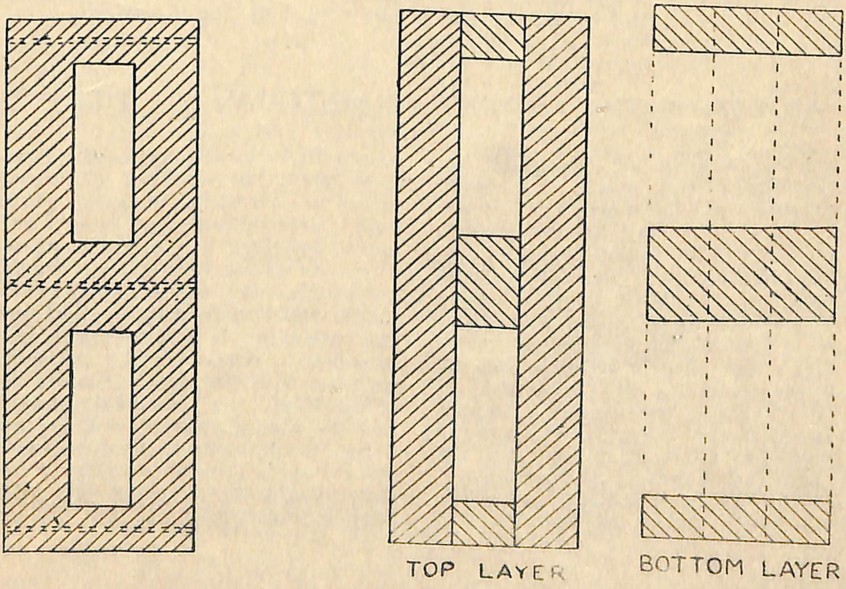
Before using, the pallets should be soaked in oil to minimise warp, and each side should be used alternately from day to day. Should any warp be apparent in a pallet that is about to be used, it should be dropped in the mould with the concave face upwards, so that the moisture from the block will tend to straighten it.

Blocks are transferred from the pallets to the curing stacks on the day following manufacture and the pallets are ready to be used again.

2. Hollow Blocks. Enough pallets are required for a day's output as with the solid blocks, but there is more work involved in their preparation, as 6 in. x 2 in. holes have to be cut in them to allow them to move up and down the cores, which are a fixture. There are two methods of making these:—

1. By cutting 6 in x 2 in holes in pallets of 1 in timber, in which case it will be found necessary to insert three steel dowels across the width to prevent warping or splitting. (See Figure 1.)

2. By making a laminated pallet, using two layers of timber nailed securely together. For the bottom layer use timber not less than $\frac{3}{8}$ in thick. Three pieces representing the full width of the mould would be sufficient for this layer, i.e., a piece 6 in x $1\frac{1}{2}$ in each end and a piece 6 in x 3 in in the centre between the cores. The top layer would be composed of 5 pieces as shown, using timber not less than $\frac{5}{8}$ in thick. (See Figure 2.)



3. **Curved Blocks.** Pallets have to be curved to suit the mould in use.

4. **Bricks.** For bricks of standard size, enough pallets for a single day's output are required, but, as these are not used inside the mould, they do not have to be precision cut, and are therefore easily prepared. They can be cut from any suitable scrap timber, packing cases, fibro, etc., but we find that scrap ends of 4 in. x 1 in. Cypress flooring are the best job and perhaps the most readily obtainable. They should be of sufficient size to hold a brick on edge, i.e., at least 9 in. x 3 in. Should any warp be apparent in the pallet about to be used, the concave face should be placed against the side of the brick that has to be turned.

PACKING THE MOULD TO VARY BLOCK THICKNESS

As the face of the block in the wall is uppermost in the machine, the actual width of the block in the wall is represented by the depth of the mould at full compression, less the thickness of pallet. The thickness of the block can therefore be regulated by bolting a wooden packing piece to the top of the plunger, which has the effect of lessening the depth of the mould. The top of the plunger is drilled for this purpose.

The thickness of the packing piece will, of course, depend on the required thickness of the block, and this is calculated from the position of the mould at full compression, i.e., when the cams are in an exact vertical position. (Note that this position is slightly before the compressing lever reaches ground level. It is a feature of the design that, when compression takes place, the cams travel a short distance past the upright position to relieve pressure on the lid catch so that a quick release of the catch can be effected.) At full compression the mould is 7 in. deep, so that the maximum depth possible with a 1 in. pallet would be 6 in. If the required thickness of block were 4 in., then the packing piece needed would be 2 in., allowing 1 in. for the pallet.

ADJUSTING THE AMOUNT OF MATERIAL FOR FILLING

The amount of material received in the mould for compression can be regulated by adjustment of the ½ in. set screws on the lower pulley bracket, as the plunger in the filling position rests on these screws. Lower the screws to increase and raise to decrease the amount of material. The setting is such that an even screeding with the top of the mould is the correct measure. It will be found necessary to make a different adjustment for each different thickness of block. It is difficult to give any standard setting as the position is affected by the type of aggregate used, the amount of water used in the mix, etc.; but it is best determined by trial and error, bearing in mind the previous remarks that there should be sufficient material in the mould that the **full weight** of the operator is needed for compression. An important point to note is that, when the mould is being filled, the material should not be pressed down, but should be allowed to find its own level, otherwise it would be difficult to ensure smooth working and uniform compression.

CAPACITY

The daily output (9 hours) varies according to the thickness of the block, the number in the working team, and whether the material is mixed by hand or mechanically. Two or even one can operate the machine, but the following figures represent work for a team of three handmixing. (Each block is the equivalent of 4 bricks of standard size when laid.)

18 in. x 6 in. x 3 in. blocks (internal cavity and partition walls)—650 per day.

18 in. x 6 in. x 4 in. blocks (external cavity)—550 per day.

18 in. x 6 in. x 5 in. blocks (single walls)—400 per day.

18 in. x 6 in. blocks (single walls)—300 per day.

The use of a power mixer will naturally cause a fair rise in these figures, the best to our knowledge recorded by a team of three is 890 blocks 18 in. x 6 in. x 4 in. However, we suggest that 750 would be a good day's work. Capacities for smaller teams can be calculated by taking a proportion of these figures.

For bricks of standard size, the output for a team of two should be in the vicinity of 1250, although we know this figure to have been exceeded. The machine itself, operated as it is by manpower, is not capable of any more than 2,000 per day, and a team of 4 would then be necessary.

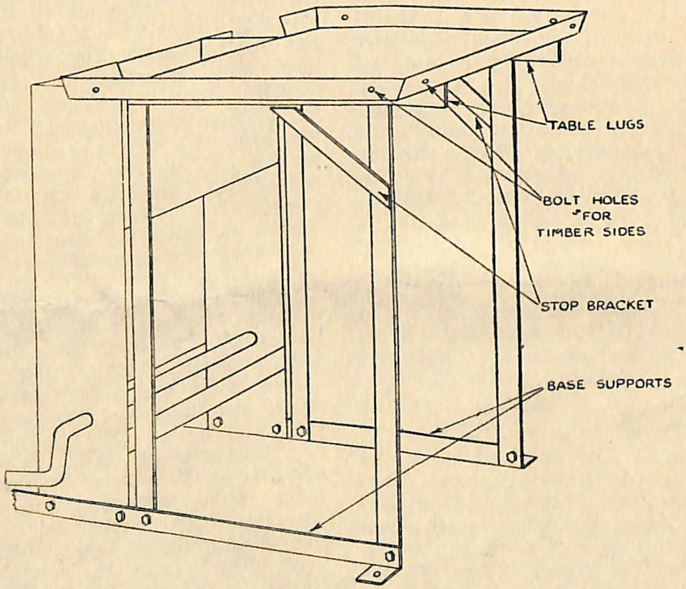
It must be realised that to attain good output figures careful planning of the job is essential. We cannot stress too much the importance of a well planned system of disposal of the freshly made product after removal from the mould. Too many manufacturers waste a great deal of time carrying the bricks unnecessary distances for stacking. Then again, the depositing of the whole day's output on ground level has this disadvantage, that the person engaged on the disposal of the newly made bricks has to do a considerable amount of stooping in the course of the day, which is tiring in itself. Two methods which can be recommended are:—

1. **Construction of temporary benches in tiers handy to the machine.** These could be constructed, say, of scaffolding timber as the work progressed each day. That is to say, as one shelf is filled, then the next shelf is laid above it, supported where necessary on cured bricks or blocks. The shelves could be carried up as high as is practicable for stacking, but care must be taken to see that they are properly supported so that there is no danger of collapse. This type of bench is easily dismantled when stacking the hardened bricks the following day, and the planks are placed in position ready for rebuilding when production starts again.

2. **The use of skids.** This is another good method which entails more permanent construction and greater space. The skids are preferably at least 2 ft. high and extend from the machine to the curing stacks. When production commences, a plank is placed across the skids near the machine to hold, say, 30 bricks. When this is filled it is pushed down to the stacking end, another plank takes its place, and so on. The number of skids required is determined by the length of the planks and the distance from the machine to the stack will depend on the daily output that has to remain on the skids overnight. Stacking will take place next day and the planks returned to the machine end ready for that day's production.

FEED TABLE

This is 2 ft. 3 ins. long by 1 ft. 6 ins. wide and has 2 in. sides which slope outwards and are drilled so that timber sides can be bolted on to any required height, according to the amount of material it is desired to accommodate on it. The table legs are bolted to the base supports of the machine and are so arranged that the tray will move 1 in. each way from a perfectly upright position. The table top is level with the top of the machine and is drawn against it for filling, the side near the machine being cut away for that purpose. When the mould is full and screeded, the table is pushed back 2 in. to allow the cable free action. Steel struts on each side prevent it moving more than 2 in. away from the machine, and all bolts are provided with lock nuts to give rigidity.



DETAILS OF MACHINES FOR CALCULATING FREIGHT

TYPE	WEIGHT.		MEASUREMENT
	Machine Only	With Feed Table	With or Without Table
No. 1 . . .	2 cwt.	2½ cwt.	6½ cub. ft.
No. 2 . . .	2 cwt.	2½ cwt.	6½ cub. ft.
No. 3 . . .	2½ cwt.	3 cwt.	6½ cub. ft.
No. 4 . . .	3 cwt.	3½ cwt.	7½ cub. ft.
No. 5 . . .	2 cwt.	2½ cwt.	6½ cub. ft.
No. 6 . . .	3½ cwt.	4 cwt.	8¼ cub. ft.

FANCY BRICKS AND BLOCKS

All machines supplied are only equipped to make plain products.

No. 1 makes plain rectangular blocks.

No. 2 makes plain rectangular blocks and curved blocks.

No. 3 makes plain rectangular blocks and small bricks.

No. 4. makes plain rectangular blocks and small bricks and curved blocks.

No. 5 makes plain rectangular blocks and hollow blocks.

No. 6 makes plain rectangular blocks and hollow blocks, curved blocks and standard size bricks. (All-purpose machine.)

Design No. 4. (See Illustration in Brochure.) Designed by a Rapid owner using an 18 in. x 6 in. x 1 in. hardwood pallet as the basis for a design plate. A good flat pallet was selected and three steel dowels inserted across the width to prevent warping or splitting. Pieces of ½ in. masonite were used to shape the design and were screwed to the pallet, the edges bordering the diamond being bevelled to prevent damage when lifting off. The pallet is dropped in on top of the material before the lid is closed. After compression the block is ejected and the pallet lifted off, leaving the imprint as shown.

As the face of the block in the wall is uppermost in the machine it will be realised that a great variety of designs can be transferred to the block in a similar manner. Design plates cut from metal ceiling scraps are frequently used.

Rock Face Design Plates. These are available in cast iron for attaching to the underside of the lid. As this involves a slight modification in construction of the machine, it is better to decide when placing the order whether this design plate is required so that the fitting can be done in the factory. It is possible, however, to use the plate in the same manner as detailed above.

Designs 5 and 6. These are made using pieces of scotia mitred at the corners. The moulding pieces are placed in the mould before filling and are lifted off after the brick has been turned on to the drying pallet. As scotia is obtainable at timber yards for approximately 3d per ft., the brick-maker would obtain a complete set for an outlay of only a few shillings.

Design No. 9. Made in the same manner as 5 and 6, using three cornered wooden moulding pieces.

Design No. 8 and Bull-nose are made using steel or wooden moulding pieces, but care must be taken to fit these when the mould is at full compression.

Design No. 7. Oblong or round holes can be made by pushing a hollow cutter into the brick just after forming and before ejection. After compression the lifting lever is drawn free of the cable so that the lid can be opened without raising the plunger. A guide made of steel or three-ply and measuring approximately 18½ in. x 6 in., is placed over the mould resting on the

side packing plates. This has holes in it to allow the insertion of the cutter and ensures the cavities being in the same place in each brick. The material is retained in the cutter when it it withdrawn and shaken free of it. Before ejecting the brick and turning on to the drying pallet the holes should be filled with damp sand to prevent cracking.

Rock-face blocks with bevelled edges can be produced in all models. Actually a full 18 in. x 6 in. x 6 in. block is made with a "V" depression running completely round the centre of the block lengthways. Three or four days later it is broken in two by tapping round the "V" with a bricklayer's bolster. Each block so made has a different pattern, but the thickness is limited to 3 in. Three cornered wooden fillets are used to mark the "V" in the block. A piece about 9 in. long is screwed to the inside of each end of the mould through the holes provided. All plungers have a "V" cut in each end to allow free movement when these end fillets are in position, and all pallets used for these blocks must have a corresponding "V" cut in each end. Two other fillets, each 18 in. long and with a "V" cut in each end, are necessary to make one double block. The method of manufacture is as follows:—

First a pallet is dropped in the mould, then one of these fillets is placed along the centre of it. The mould is filled, the material spread, and the other filled laid along the top. The block is then compressed and ejected, the top fillet being carried clear of the machine and lifted off before transfer of the block to the storage benches. The top fillet can be used over and over again and it is also possible to draw out the fillet under the block each time; but for speed of operation, it is a much better arrangement to have a separate piece for each pallet; in other words, a separate piece for each double block made in a day.

Price list of attachments for making special designs as detailed above is available on application.

WONDER BOND BLOCKS

The radius of the curved mould supplied is not adjustable, but is fixed at the particular radius ordered. The length of the block is so arranged that a complete course of the diameter required is made up of full blocks, thus eliminating half-blocks (allowing approximately 5/16 in. for mortar joint). The number of blocks to the course for different radii is shown in the following table:—

INSIDE RADIUS	THICKNESS OF BLOCK	NUMBER TO COURSE
1 ft.	3¾ ins.	6
2 ft.	4 ins.	10
2 ft. 6 ins.	4¼ ins.	12
3 ft.	4½ ins.	15
3 ft. 6 ins.	4¾ ins.	17
4 ft.	4⅞ ins.	19
5 ft.	5 ins.	23
6 ft.	5⅛ ins.	27
7 ft.	5¼ ins.	31
7 ft. 6 ins.	5¼ ins.	33
8 ft.	5⅜ ins.	35
10 ft.	5½ ins.	44

The depth of the blocks can be varied by following the procedure detailed under the heading "Packing the Mould to Vary Block Thickness." However, where tanks and silos are con-

cerned, it is best to utilise the full depth of the mould and make the blocks 6 in. deep.

Prospective tank and silo builders would be well advised to secure copies of the following excellent publications available from the Cement & Concrete Association of Australia, 14 Spring Street, Sydney, N.S.W.

Concrete Troughs, Tanks and Wells.

Concrete Silos.

These give full details of construction from foundations to the finished job.

MINIMUM WALL THICKNESS FOR SINGLE STORY BUILDING

As laid down by N.S.W. Department of Local Government Standard Specifications, No. 4.

Single Leaf External Walls.

1. For habitable buildings: 6 in. (Solid or Hollow units.)
2. For sheds, laundries, and outhouses: 3¾ in.

Double Leaf External Walls.

1. External Leaf: 3¾ in.
2. Internal Leaf: 3 in.

Partition Walls and Non-load. Bearing Walls: 3 in.

All Load Bearing Walls: 3¾ in.

Other important factors have to be taken into consideration, such as the classification of blocks as regards the structural and physical properties, and the intending builder is advised to secure a copy or make himself familiar with the requirements of the above specifications (or the standard specifications issued by the authorities in his State or locality).

MIXTURE

For pressed work, the concrete must not be too wet, otherwise the newly-made blocks tend to slump and the material will be inclined to stick to the lid of the mould, thereby spoiling the surface of the block.

A damp mix is essential for a good job. It can be tested by picking up a handful and squeezing it into a ball. The material should keep the ball shape and slight moisture should appear on the hand. If water drips out of the machine during compression, the concrete is much too wet. A little experimenting is all that is necessary, but, at the same time, care must be taken to see that the material is dampened throughout and that there are no dry spots.

The best type of mixer for dry mixing is the pan type.

AGGREGATES

The main requirements in the selection of the material to be added to cement to form concrete are that it must be clean and inert. Concrete, however, cannot be stronger than the materials with which it is made, nor will it be more durable or weatherproof.

PROPORTIONS

"Blocks may be made using coarse and fine aggregate or coarse or fine aggregate alone. Blocks shall contain **not more than** 94 lb. of cement (1 bag) to 6 cubic feet of combined fine and coarse aggregate, separately measured, except that where the thickness of any major part of a hollow block is 1 in. or less, or where no coarse aggregate is used, the proportion of cement to mixed aggregates or fine aggregate may be increased to 94 lb. of cement to 5 cubic feet of combined fine and coarse aggregate or fine aggregate, respectively, separately measured." (N.S.W. Department of Local Government Standard Spec., No. 4: Part 1, Paragraph 5.)

This means that where a mixture of gravel, sand, and cement is used, the maximum richness of mix shall be 4: 2: 1. Where sand and cement only is used the maximum richness shall be 5 to 1.

MATERIALS MOST GENERALLY USED

1. **Sand-cement.** (a) The usual mixture for good, clean, coarse sand as from a river bed is 6 to 1. If the sand has a good proportion of pebbles in it, then the mix could be weaker, as the strength of the concrete would be in the proportion of fines to the cement.

(b) The usual mixture for fine sand is 5 to 1 or 6 to 1, but no weaker. Beach gravel and sand contain salt, but not in sufficient quantities to affect the strength of the concrete, although the salt may cause efflorescence or "bloom" on the hardened concrete. For this reason, it is preferable to select drift sand for bricks, when beach sand is the only type procurable.

2. **Gravel-sand-cement.** The mixture could be from 4:2:1 to 6:3:1, according to the quality of the materials. Using a mixture of blue metal, sand, and cement in the proportions of 6:3:1, the blockmaker will have no difficulty in meeting the requirements of A1 classification.

3. **Cinders.** The term "cinders" should be restricted to the residue, containing more or less carbonaceous matter, from high-temperature combustion of coal or coke. Such combustion will generally have occurred under some degree of forced draft, and these materials have generally been found to be only ones giving satisfactory results. Cinders for aggregate, therefore, should be obtained from industrial plants, gas works, locomotives or similar sources where a large amount of coal is burned, as this usually entails uniformity of coal and efficient firing, with the result that cinders do not vary greatly. Residue from small domestic furnaces generally is not suitable.

A good all-purpose mix would be 6 or 7 to 1, or, if graded into coarse and fines, 4 of coarse and 3 of fine to 1 of cement.

4. **Cinders Sand.** This has the advantage of increasing workability and will be stronger than the cinders alone. A recommended mix would be 5 cinders: 2 sand: 1 cement.

Full information re the use of other aggregates which may be available, can be obtained from the manufacturers on application.

CURING

Concrete bricks or blocks should be thoroughly cured before being built into any wall.

They should be kept continuously damp for a period of not less than seven days after manufacture and then exposed to the atmosphere for a further fourteen days before use.

COST

The cost of the bricks or blocks varies according to the local prices and availability of materials used in their manufacture. To assist you in making estimates, we supply below details of the quantity of bricks or blocks to the bag of cement for various mixtures.

INGREDIENTS			NUMBER OF BLOCKS PRODUCED					
			Solid Blocks, 18" x 6"					
Metal or Similar Ag'gate	Sand	Cement	3" wide	4" wide	5" wide	6" wide	Hollow Blocks 18" x 6" x 6"	Standard Bricks
4 c. ft.	2 c. ft.	1 bag	27	20	16	14	18	90
5 c. ft.	2½ c. ft.	1 bag	33	25	20	17	22	108
6 c. ft.	3 c. ft.	1 bag	40	30	24	20	26	126
	5 c. ft.	1 bag	27	20	16	14	17	90
	6 c. ft.	1 bag	32	24	19	16	21	108

EXTERIOR WALL FINISHES

The builder, who uses concrete bricks or blocks, has recourse to a variety of attractive exterior finishes.

Bricks can be coloured to resemble clay products, the general practice being to colour the whole of the brick. Naturally the colouring would be confined to bricks for exterior use only, since, in most cases, the inside walls are subsequently plastered or rendered.

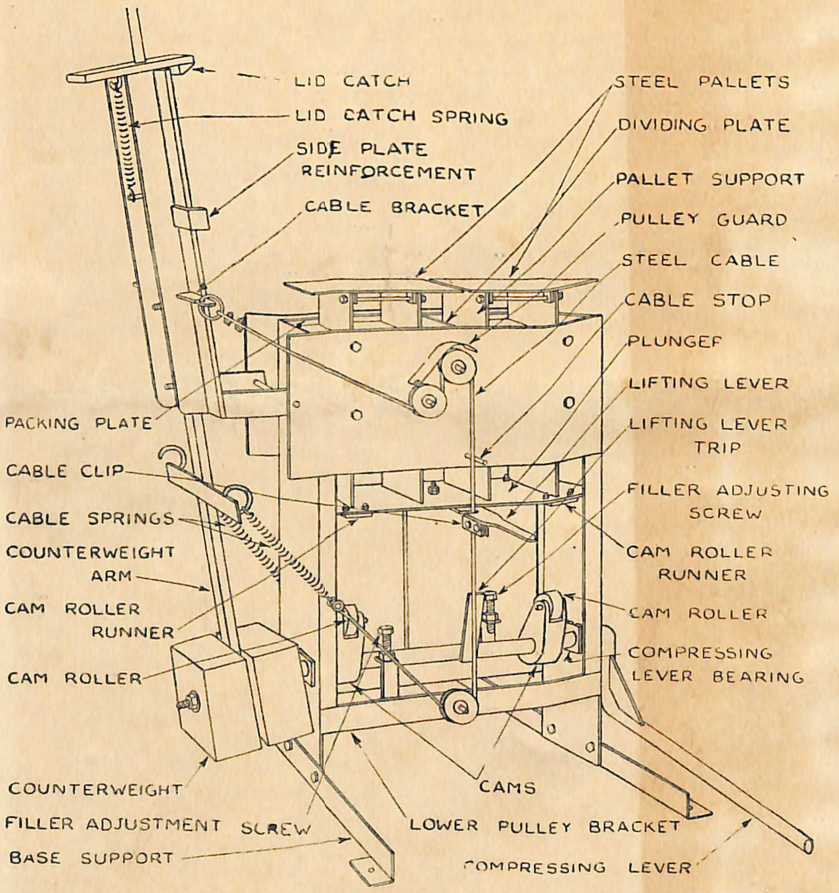
Blocks can be faced and coloured. When no coarse aggregate is used, the block automatically becomes a faced block. As the face of the block is uppermost in the machine during manufacture, a facing mixture can also be applied, before compression, to the surface of a mixture employing a coarse aggregate, the thickness of this facing being ½ in. to 1 in. Coloured facings on blocks made of either fine or coarse aggregates can be produced in the same manner.

With faced blocks or bricks a modern and harmonious effect is obtained by finishing the vertical joints flush with the brickwork and raking out the horizontal joints to give a series of horizontal parallel lines. The distance between the raked joints is a matter for individual taste, those horizontal joints not required being finished off flush similar to the vertical ones.

Another very pleasing effect is the use of faced blocks or bricks in the natural cement colour with the joints pointed in red or black mortar.

Exterior walls can be cement rendered in many beautiful and modern texture finishes. Concrete blocks or bricks are especially suited for this type of work and the block made with a coarse aggregate such as blue metal, gravel, cinders, etc., gives a rough surface which makes an ideal "key" for rendering and plastering.

Detailed Illustration of "RAPID" No. 3.



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